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الرياض

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Bode diagram :-

$$GH(s) = |GH(s)| \angle (GH(s))$$

$$M_{dB} = 20 \log M$$

$$GH(s) = \frac{250 (s+2)}{s(s+5)(s+20)}$$

Required - Bode diagram

① Time constant form $\frac{s+2}{s+p} \Rightarrow \frac{1+\tau_1 s}{1+\tau_2 s}$

note: this parameter is K_{dc}
"DC Gain"

$$GH(s) = \frac{250 (s+2)}{s(s+5)(s+20)} = \frac{250 \times 2 (1 + \frac{s}{2})}{s \times 5 (1 + \frac{s}{5}) \times 20 (1 + \frac{s}{20})} = \frac{5 (1 + \frac{s}{2})}{s (1 + \frac{s}{5}) (1 + \frac{s}{20})}$$

② $s \rightarrow j\omega$

$$GH(j\omega) = \frac{5 (1 + \frac{j\omega}{2})}{j\omega 5 (1 + \frac{j\omega}{5}) (1 + \frac{j\omega}{20})}$$

LM \xrightarrow{vs} $\log \omega$ and $\phi \xrightarrow{vs}$ $\log \omega$

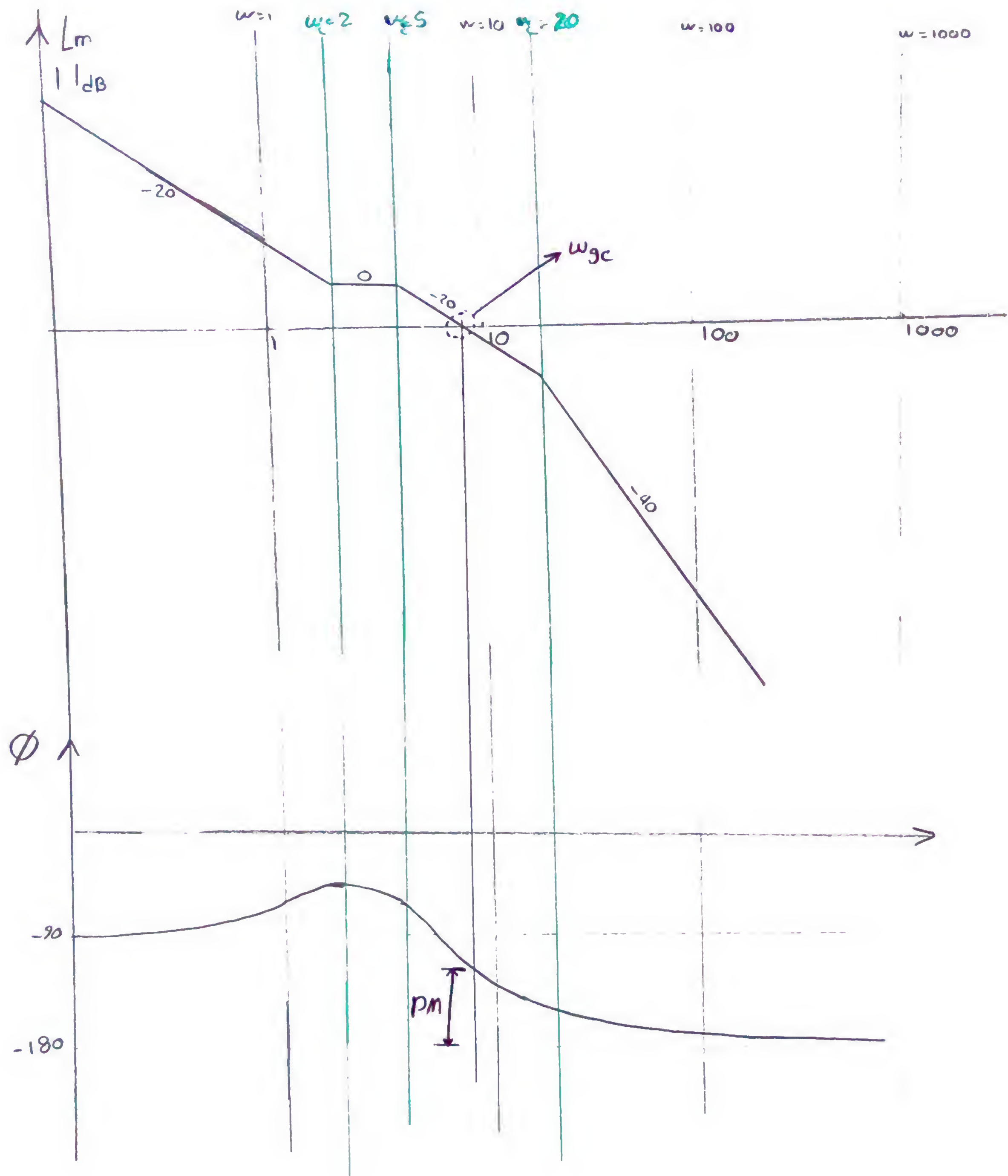
$$\frac{5}{j\omega} \therefore 20 \log \left| \frac{5}{\omega} \right| = 20 \log 5 - 20 \log \omega$$

③ table :-

term	Curve	term	Curve
$\frac{5}{j\omega}$		$\frac{1}{1 + \frac{j\omega}{20}}$	
$\frac{1}{(1 + \frac{j\omega}{2})}$			
$\frac{1}{(1 + \frac{j\omega}{5})}$			

①

④



⑤ $PM = 180 + \phi \Big|_{\substack{L_m=0 \\ L_m=1}}$

$$GM = \frac{1}{n} \quad @ \quad \phi = -180 \quad \Rightarrow \quad GM_{dB} = -L_m \quad @ \quad \phi = -180$$

$$GM = \infty, \quad \omega_{pc} = \infty$$

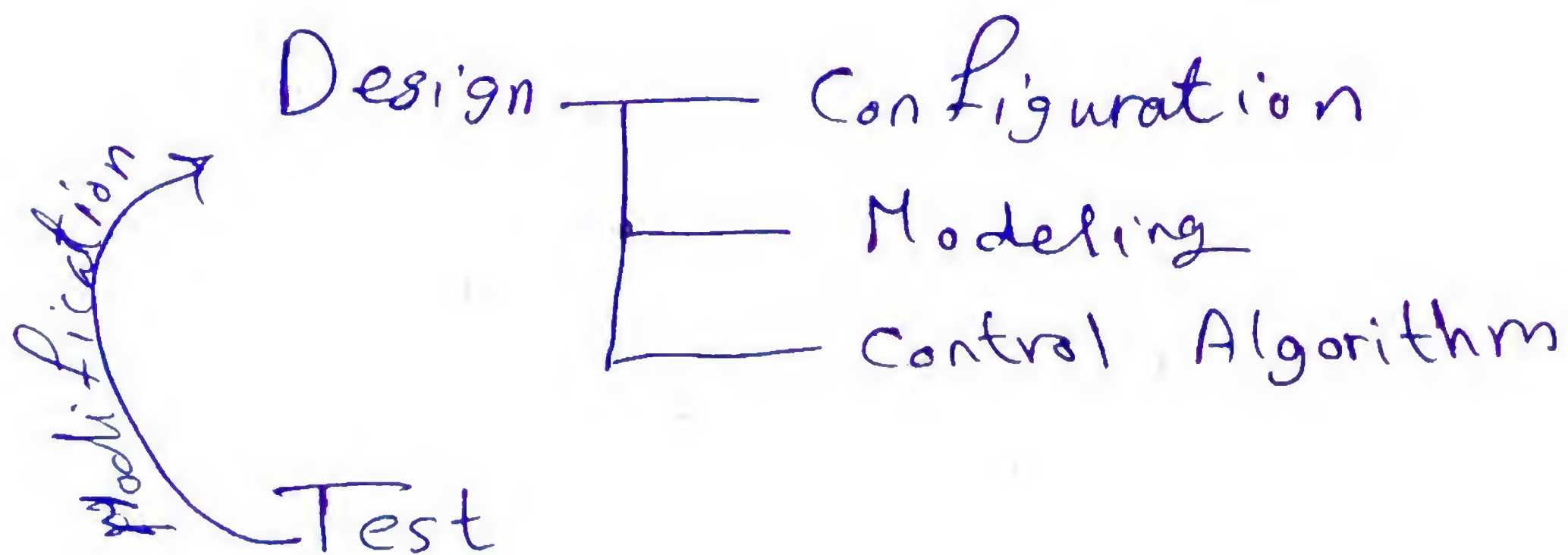
②

Requirement Collection

Requirements Analysis

Design Specs (t_s , M_p , speed)

عوامل تصميم أي مشروع



Modern Control Systems
نظم التحكم الحديثة

مطلوب : اختيار و تحليل Specs